TEST CODE **01230032**

FORM TP 2011090

MAY/JUNE 2011

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

INTEGRATED SCIENCE

Paper 03/2 – Alternative to SBA

2 hours

In addition to the 2 hours, candidates are allowed 10 minutes to read through the entire paper. Writing may begin during the 10-minute period.

READ THE FOLLOWING DIRECTIONS CAREFULLY.

1. Answer ALL questions.
2. Use this answer booklet when responding to the questions. For EACH question, write your answers in the spaces provided and return the answer booklet at the end of the examination.
3. The use of a silent non-programmable calculator is permitted.

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Answer ALL questions

1. Jerome used the information in Table 1a to prepare the materials depicted in Figure 1a. He then assembled the parts to make a homemade balance.

TABLE 1a. MATERIALS USED TO MAKE THE BALANCE

Parts of the Balance	Materials Used
Equal arms	Notched 100 cm long rod with two small holes at the end.
Base of balance	A 50 cm x 20 cm long block which is 5 cm high with a 1 cm diameter hole drilled to accommodate the fulcrum rod.
Pivot rod	A 50 cm long rod which has a diameter of 1 cm.
Scale pans	Two cups with a base of diameter 5 cm. Three holes are drilled at the top. The reel of string is used to attach the scale pans to the equal arms.

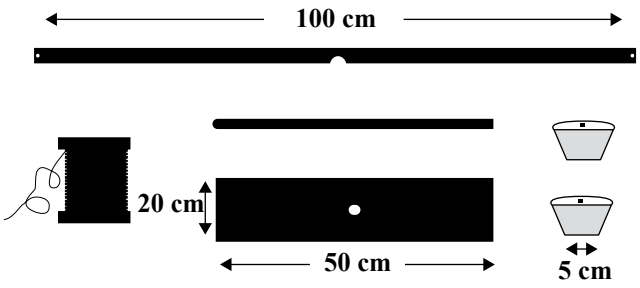


Figure 1a

(a) Make a large labelled drawing of the assembled balance in the space provided on page 3. Your drawing should be two dimensional and include:

- Correct labelling
- Clear lines
- The title of the drawing

(5 marks)

(b) The centre of gravity of the block and pivot rod for two designs of the base block is marked by a dot in Figure 1b. Draw an arrow to represent the weight of each block and pivot rod in Figure 1b.

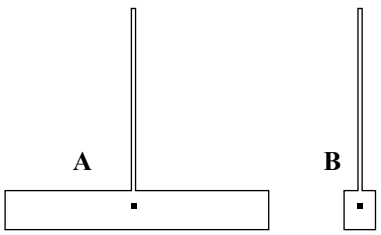


Figure 1b

(1 mark)

(c) Pivot rod and block A and pivot rod and block B have been tilted through the same angle in Figure 1c below.

(i) On which side will A fall when it is released?

_____

(1 mark)

(ii) Give a reason for your answer in (c) (i) above.

_____

_____

_____

(1 mark)

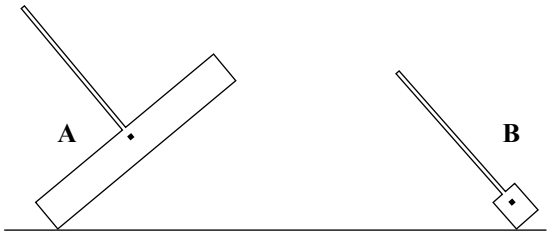


Figure 1c

(iii) On which side will B fall when it is released?

_____

(1 mark)

(iv) Give a reason for your answer in (c) (iii).

_____

_____

_____

(1 mark)

(d) Jerome uses the spring balance in Figure 1d to find the mass of the coins he intends to use with his equal arm balance. He is curious about the effect of adding more of the same kind of coins on the spring balance, so he adds more coins to the spring and records the total mass in Table 1b.

TABLE 1b. MASS OF COINS

No. of Coins	Mass (g)
0	
1	4.5
2	7.0
3	7.5
4	
5	11.5
6	14.0
7	16.5

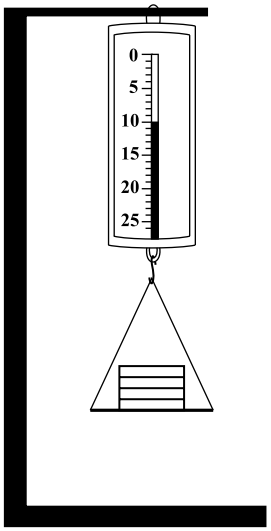


Figure 1d

(i) What is the reading on the scale in Figure 1d when FOUR coins are placed on the pan?

_____

(2 marks)

(ii) On the graph paper provided on page 6, plot a line graph of Jerome's results for the mass against the number of coins. Start both scales at 0 and include your reading for four coins in the plot. Draw the best-fit straight line. Extend the line to cut the vertical axis. **(6 marks)**

(iii) Label the axes on the graph. **(1 mark)**

(iv) State an appropriate title for the graph.

_____

(1 mark)

(v) Use your graph to determine the reading when there are no coins on the scale pan.

_____

(2 marks)

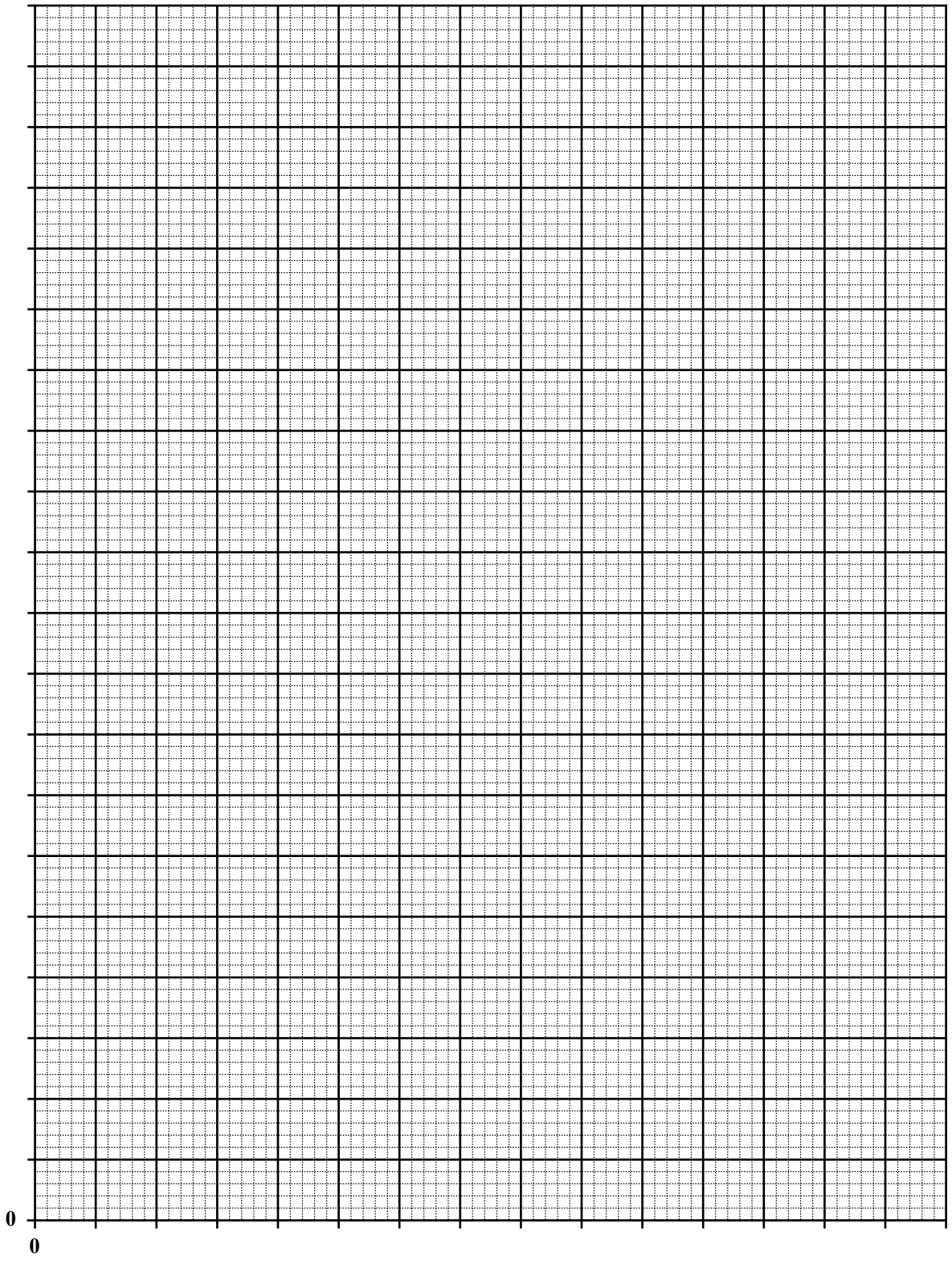
(vi) Write a hypothesis relating the effect of adding additional coins on the mass recorded by the spring balance.

_____

_____

(2 marks)

GO ON TO THE NEXT PAGE



Total 24 marks

GO ON TO THE NEXT PAGE

NOTHING HAS BEEN OMITTED

2. An experiment was set up to demonstrate the movement of solvent into cells. Four strips of potato were placed in a petri dish containing 50 cm^3 of water. The dimensions of the strips at the start of the experiment are indicated in Figure 2a. The actual dimensions of the potato strips 4 hours after the start of the experiment are indicated in Figure 2b.

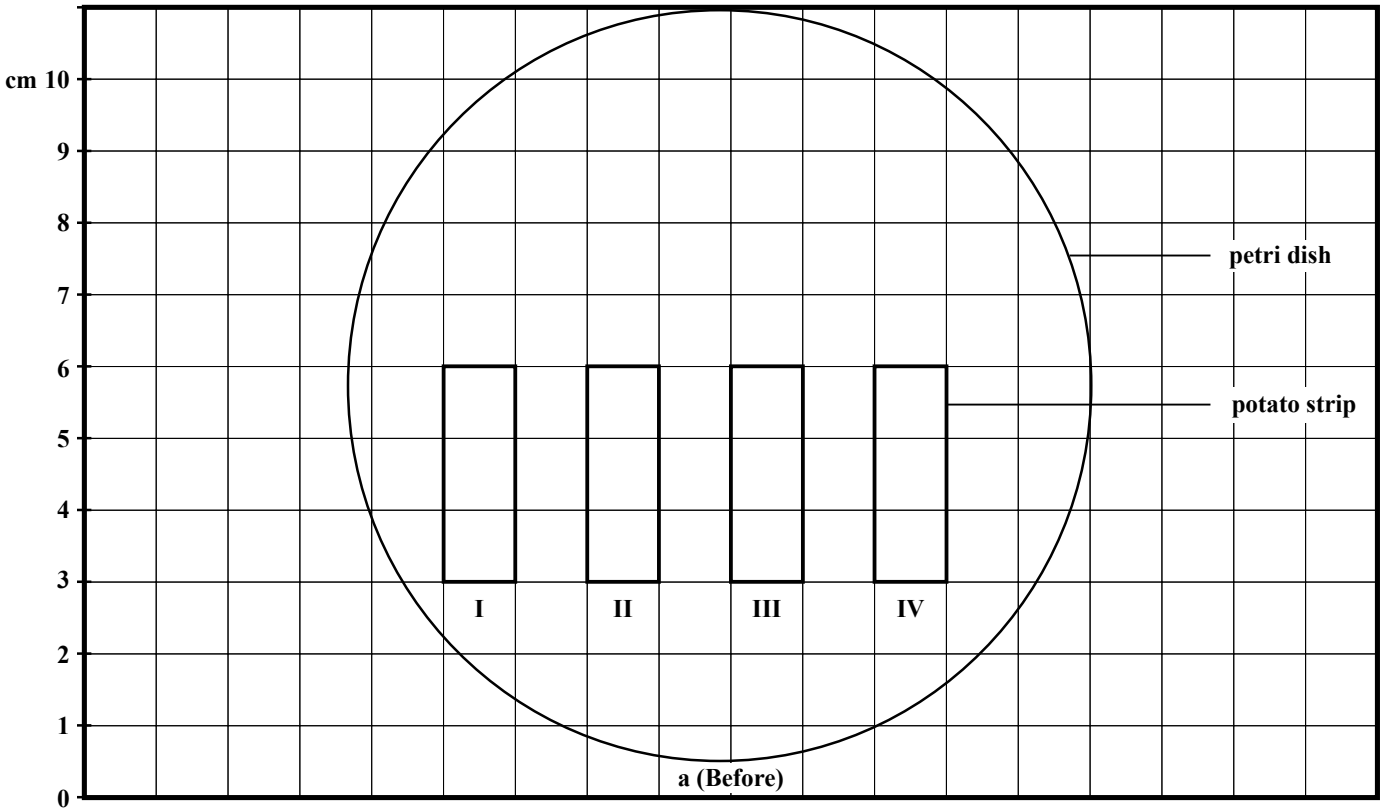


Figure 2a. Diagram showing the potato strips in water before the experiment

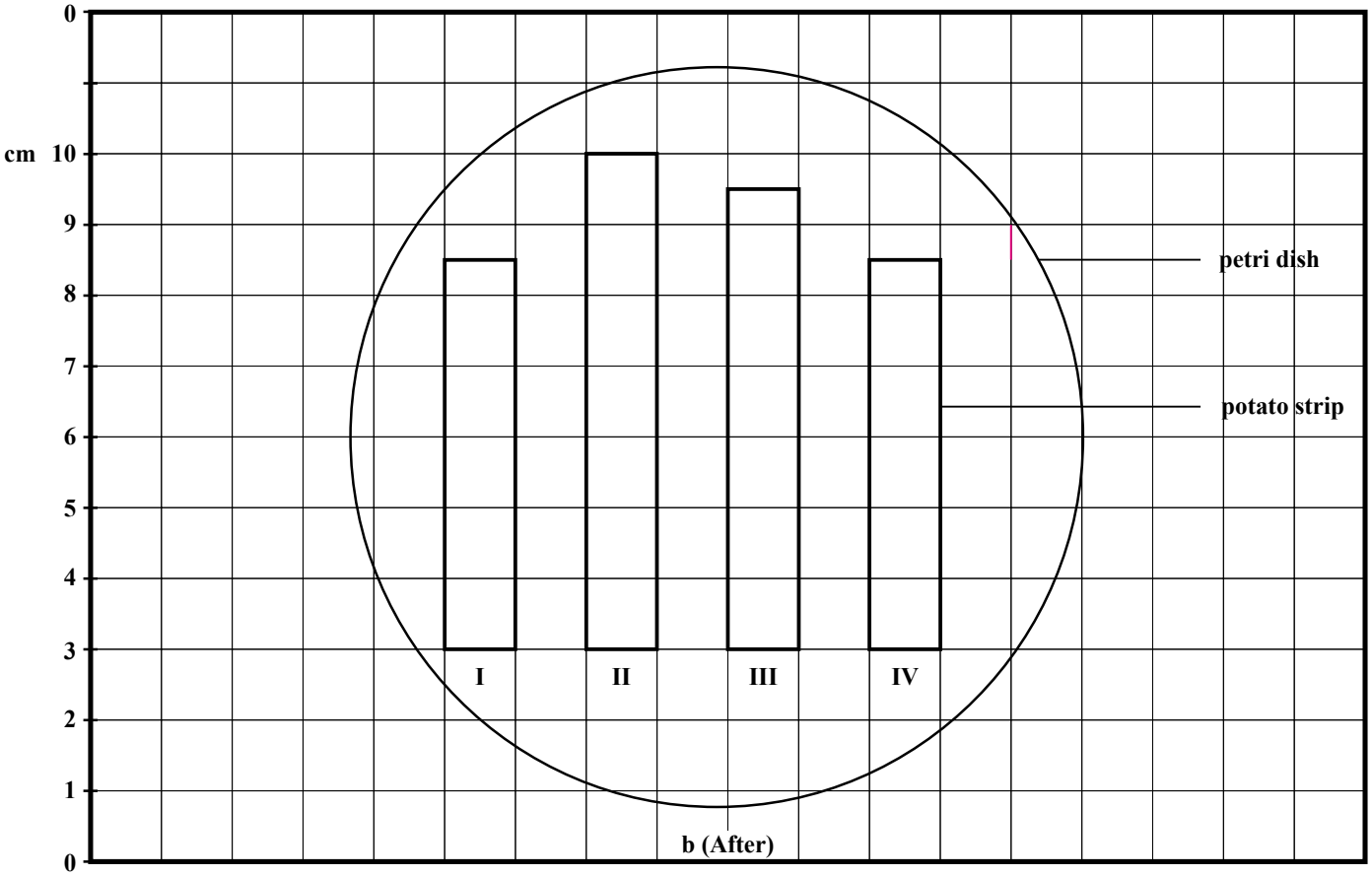


Figure 2b. Diagram showing the potato strips in water after the experiment

(a) (i) Examine the diagrams of the potato strips at the beginning of the experiment as shown in Figure 2a. Measure the length of the strips and record your measurements in Table 2. **(1 mark)**

(ii) Examine the diagrams of the potato strips at the end of the experiment as shown in Figure 2b. Measure the length of the strips and record your measurements in Table 2. **(5 marks)**

(iii) Calculate the change in length for EACH strip and write your answers in Table 2.

(3 marks)

TABLE 2: _____

Structure	**Lengths of Strips (cm)**		**Change in length**
	Before	After	
I			
II			
III			
IV			

(b) (i) Which potato strip had the GREATEST increase in length?

_____

(1 mark)

(ii) Suggest a reason why the length of all the potato strips did NOT increase by the same amount.

_____

(1 mark)

(iii) What is the name of the process that is responsible for the change in length of the potato strips?

_____

(1 mark)

GO ON TO THE NEXT PAGE

(c) Suggest a suitable title for your table in the space provided at the top of the table.

(1 mark)

(d) (i) State ONE variable that was controlled in the experiment.

_____

(1 mark)

(ii) Why were four strips of potato used in the experiment?

_____

(1 mark)

(e) (i) How can the experiment be modified to investigate the effect of a solute on the direction of movement of a solvent?

_____

(1 mark)

(ii) Identify ONE variable that would be controlled in the experiment in (e) (i) above.

_____

(1 mark)

(iii) Write a hypothesis for the modified experiment.

_____

(1 mark)

Total 18 marks

3. John, a Form 4 student, washed and dried four 50 cm^3 measuring cylinders which he labelled A, B, C and D. He obtained water from four different sources, 25 cm^3 of which was poured into A, B, C and D respectively. He then added 5 cm^3 of soap solution to each cylinder. He covered each cylinder with a plastic cap and shook it until a permanent lather was formed.

John made the following observations:

- Cylinder A had a lather of 5 cm^3.
- Cylinder B had a lather of 7 cm^3.
- Cylinder C had a lather of 3 cm^3.
- Cylinder D had a lather of 1 cm^3.

(a) Draw and label a large diagram of ONE of the measuring cylinders and its contents used in the experiment.

(2 marks)

(b) (i) Why was it more appropriate to use measuring cylinders than boiling tubes in the experiment?

_____

_____

_____

_____

(1 mark)

(ii) What THREE precautions should John take when using the measuring cylinders to ensure the most accurate results?

_____

_____

_____

_____

(3 marks)

(iii) Why did John wash the measuring cylinders before performing the experiment?

_____

_____

_____

(1 mark)

(c) (i) State an appropriate aim for the experiment that John performed.

_____

_____

_____

(1 mark)

(ii) List ALL the apparatus and materials that John used to perform this experiment.

_____

_____

_____

_____

_____

(2 marks)

(iii) Record the results of the experiment in Table 3 below. **(4 marks)**

TABLE 3

(iv) Write a suitable title for Table 3 above.

_____

(1 mark)

(d) (i) From the results that John obtained indicate which of the samples of water, A, B, C, or D, was the HARDEST.

_____

(1 mark)

(ii) Give a scientific explanation for your answer in (d) (i) above.

_____

_____

_____

_____

_____

(2 marks)

Total 18 marks

END OF TEST